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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES

: 09/621,407
Applicants : Domino et al.
Filed : July 21, 2000
Art Unit : 2686
Examiner : Nagmeh Mehrpour
Docket No. : 013629.00030
Customer No. : 33649

Confirmation No. 4092

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Dated: November 2, 2006

Joan B. Farragher
Joan B. Farragher

ATTENTION: Board of Patent Appeals and Interferences

TRANSMITTAL OF APPEAL BRIEF

In response to the Notification of Non-Compliance with the Requirements of 37 CFR 41.37, enclosed is the substitute Appellant's Brief. A check in the amount of \$500.00 was filed with the original Appellant's Brief mailed on November 2, 2005. This Appellant's Brief is timely filed within the 30-day period set forth with the mailing of the Notification on November 6, 2006. Therefore, no fees are believed due with the filing of this substitute Appellant's Brief; however, the Commissioner is hereby authorized to charge any additional fee or credit any refund to the deposit account of Jackson Walker L.L.P., No. 10-0096.

Dated: November 21, 2006 _

Respectfully submitted,

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09/621,407

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS AND INTERFERENCES**

Appl. No. : 09/621,407
Applicants : Domino et al.
Filed : July 21, 2000
Art Unit : 2686
Examiner : Nagmeh Mehrpour
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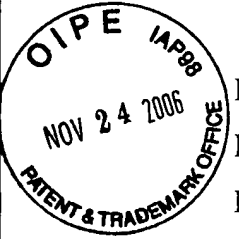
ATTENTION: Board of Patent Appeals and Interferences

APPELLANT'S BRIEF (37 C.F.R. 41.37)

This brief is in furtherance of the Notice of Appeal, filed in this case on November 18, 2005, the Notice of Non-Complaint Appeal Brief mailed November 6, 2006, and the Final Office Action mailed October 14, 2005.

The fees required under § 1.17(c), and any required petition for extension of time for filing this brief and related fees are dealt with in the accompanying TRANSMITTAL OF APPEAL BRIEF.

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The final page of this brief bears the practitioner's signature.

I REAL PARTIES IN INTEREST (37 C.F.R. 41.37(c)(1))

The real party in interest in this appeal is:

☒ the following party:

Skyworks Solutions, Inc., by an assignment from the Inventors to Conexant Systems, Inc., recorded at Reel 01101, Frame 0229 on 7/21/2000; an assignment from Conexant Systems, Inc. to Washington Sub., Inc. recorded at Reel 13177, Frame 505 on 8/14/2002; the merger of Washington Sub., Inc. into Alpha Industries, Inc., recorded at Reel 13239, Frame 758 on 9/3/2002; and the merger of Alpha Industries, Inc. into Skyworks Solutions, Inc., recorded at Reel 13450, Frame 880 on 10/6/2003.

II RELATED APPEALS AND INTERFERENCES

(37 C.F.R. 41.37(c)(2))

With respect to other appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in the pending appeal:

4 ☒ there are no such appeals or interferences.

III STATUS OF CLAIMS (37 C.F.R. 41.37(c)(3))

A. TOTAL NUMBER OF CLAIMS IN APPLICATION

Claims in the application are: 23 .

B. STATUS OF ALL THE CLAIMS IN APPLICATION

1. Claims rejected: Claims 1 through 23

C. CLAIMS ON APPEAL

The claims on appeal are: Claims 1 through 23

IV STATUS OF AMENDMENTS (37 C.F.R. 41.37(c)(4))

No amendments have been submitted subsequent to the final rejection of the claims.

V SUMMARY OF THE CLAIMED SUBJECT MATTER (37 C.F.R. 41.37(c)(5))

Claim 1 includes a system for transmitting and receiving data comprising a direct-conversion receiver receiving a signal modulated on a carrier frequency signal, the direct-conversion receiver further comprising one or more subharmonic local oscillator mixers; a local oscillator coupled to the direct conversion receiver, the local oscillator generating a signal having a frequency equal to a subharmonic of the carrier frequency signal; and a transmitter coupled to the local oscillator (by way of example and not of limitation, see Fig. 1 and description at page 7, line 8 to page 12, line 6).

Claim 2 includes the system of claim 1 wherein the direct conversion receiver further comprises: a phase shifter coupled to a first subharmonic local oscillator mixer, where the output of the first subharmonic local oscillator mixer is used to generate a quadrature signal of a phase shift keyed signal; and a second subharmonic local oscillator mixer, where the output of the second subharmonic local oscillator mixer is used to generate an in-phase signal of a phase shift keyed signal (by way of example and not of limitation, see Fig. 1 and description at page 7, line 8 to page 12, line 6).

Claim 3 includes the system of claim 2 wherein the phase shifter is further coupled to the local oscillator (by way of example and not of limitation, see Fig. 1 and description at page 7, line 8 to page 12, line 6).

Claim 4 includes the system of claim 2 further comprising a low-noise amplifier coupled to the phase shifter, wherein the signal modulated on the carrier frequency signal is received by the low-noise amplifier and is transmitted to the phase shifter after being amplified (by way of example and not of limitation, see Fig. 1 and description at page 7, line 8 to page 12, line 6).

Claim 5 includes the system of claim 1 further comprising a frequency multiplier coupled between the local oscillator and the transmitter, wherein the frequency multiplier increases the frequency of the oscillator (by way of example and not of limitation, see Fig. 1 and description at page 7, line 8 to page 12, line 6).

Claim 6 includes the system of claim 5 wherein the frequency multiplier increases the frequency of the oscillator up to the frequency of the carrier signal (by way of example and not of limitation, see Fig. 1 and description at page 7, line 8 to page 12, line 6).

Claim 7 includes the system of claim 1 wherein the transmitter comprises: a frequency multiplier coupled to the local oscillator; and an in-phase/quadrature modulator coupled to the

frequency multiplier, receiving an in-phase modulation input signal and a quadrature modulation input signal, and outputting a quadrature phase shift keyed signal modulated at the multiplied local oscillator frequency (by way of example and not of limitation, see Fig. 1 and description at page 7, line 8 to page 12, line 6).

Claim 8 includes 8 includes the system of claim 1 wherein the transmitter comprises: an in-phase/ quadrature modulator coupled to the local oscillator, receiving an in-phase modulation input signal and a quadrature phase shift keyed signal modulated at the local oscillator frequency; and a frequency multiplier coupled phase/quadrature modulator and multiplying the quadrature phase shift keyed signal (by way of example and not of limitation, see Fig. 3 and description at page 13, line 11 to page 14, line 23).

Claim 9 includes the system of claim 1 wherein the transmitter comprises: a frequency modulator coupled to the local oscillator, wherein the local oscillator is modulated by the frequency modulator; a phase locked loop coupled to the frequency modulator and the local oscillator; and a switch coupled between the local oscillator and the phase locked loop, wherein the switch can couple the phase locked loop to the local oscillator during a transmit cycle and can decouple the phase locked loop from the local oscillator during a receive cycle (by way of example and not of limitation, see Fig. 4 and description at page 14, line 24 to page 16, line 15).

Claim 10 includes the system of claim 1 wherein the transmitter comprises: a frequency modulator coupled to the local oscillator, where the local oscillator is modulated by the frequency modulator; a voltage-controlled reference oscillator coupled to the frequency modulator, where the voltage-controlled reference oscillator is modulated by the frequency modulator; and a phase locked loop coupled to the local oscillator in a feedback loop, the phase locked loop further coupled to the voltage controlled oscillator (by way of example and not of limitation, see Fig. 5 and description at page 16, line 16 to page 17, line 21).

Claim 11 includes a method for receiving and transmitting data comprising: receiving a carrier signal modulated with a data signal; mixing the carrier signal with a subharmonic local oscillator signal to extract a baseband signal; multiplying the subharmonic local oscillator signal; and modulating an outgoing data signal with the multiplied subharmonic local oscillator signal (by way of example and not of limitation, see Fig. 6 and description at page 17, line 22 to page 20, line 2).

Claim 12 includes the method of claim 11 wherein mixing the carrier signal with the

subharmonic local oscillator signal to extract the baseband signal further comprises: mixing the carrier signal with the subharmonic local oscillator signal to extract an in-phase signal; phase-shifting the subharmonic local oscillator signal; and mixing the carrier signal with the phase-shifted subharmonic local oscillator signal to extract a quadrature phase signal (by way of example and not of limitation, see Fig. 6 and description at page 17, line 22 to page 20, line 2).

Claim 13 includes the method of claim 11 wherein mixing the carrier signal with the subharmonic local oscillator signal to extract the baseband signal further comprises: mixing the carrier signal with the subharmonic local oscillator signal to extract an in-phase signal; phase-shifting the carrier signal; and mixing the phase-shifted carrier signal with the subharmonic local oscillator signal to extract a quadrature phase signal (by way of example and not of limitation, see Fig. 6 and description at page 17, line 22 to page 20, line 2).

Claim 14 includes the method of claim 11 wherein modulating the outgoing data signal with the subharmonic local oscillator signal comprises: multiplying the subharmonic local oscillator signal; and modulating an outgoing in-phase data signal and an outgoing quadrature phase data signal with the multiplied subharmonic local oscillator signal (by way of example and not of limitation, see Fig. 6 and description at page 17, line 22 to page 20, line 2).

Claim 15 includes the method of claim 11 wherein modulating the outgoing data signal with the subharmonic local oscillator signal comprises: modulating an outgoing in-phase data signal and an outgoing quadrature phase data signal with the subharmonic local oscillator signal to generate a modulated outgoing data signal; and multiplying the modulated outgoing data signal to generate the outgoing data signal (by way of example and not of limitation, see Fig. 6 and description at page 17, line 22 to page 20, line 2).

Claim 16 includes the method of claim 11 wherein modulating the outgoing data signal with the subharmonic local oscillator signal comprises: frequency modulating the subharmonic local oscillator signal during a transmit cycle; and interrupting frequency modulation of the subharmonic local oscillator signal during a receive cycle (by way of example and not of limitation, see Fig. 6 and description at page 17, line 22 to page 20, line 2).

Claim 17 includes the method of claim 16 further comprising opening a phase locked loop during the transmit cycle to lock the subharmonic local oscillator signal (by way of example and not of limitation, see Fig. 6 and description at page 17, line 22 to page 20, line 2).

Claim 18 includes the method of claim 16 further comprising frequency modulating a

reference oscillator signal of a phase locked loop that locks the subharmonic local oscillator signal (by way of example and not of limitation, see Fig. 6 and description at page 17, line 22 to page 20, line 2).

Claim 19 includes the method of claim 11 wherein modulating the outgoing data signal with the subharmonic local oscillator signal comprises: modulating an outgoing in-phase data signal and an outgoing quadrature phase data signal with the subharmonic local oscillator signal at a subharmonic modulation index to generate a modulated outgoing data signal; and multiplying the modulated outgoing data signal by an inverse subharmonic to generate the outgoing data signal (by way of example and not of limitation, see Fig. 6 and description at page 17, line 22 to page 20, line 2).

Claim 20 includes a system for transmitting and receiving data comprising: a low noise amplifier receiving a modulated incoming carrier signal having a carrier signal frequency; a local oscillator generating a signal having a subharmonic frequency of the carrier signal; a first mixer coupled to the low noise amplifier and the local oscillator, the first mixer receiving the modulated incoming carrier signal and generating an in-phase incoming data signal; a second mixer coupled to the low noise amplifier and the local oscillator, the second mixer receiving the modulated incoming carrier signal and generating a quadrature phase incoming data signal; a modulator coupled to the local oscillator, the modulator receiving an outgoing data signal and modulating the outgoing data signal onto the local oscillator signal to generate an outgoing modulated carrier signal; and a transmit amplifier coupled to the modulator, the transmit amplifier amplifying the outgoing modulated carrier signal to a transmission power level (by way of example and not of limitation, see Fig. 1 and description at page 7, line 8 to page 12, line 6).

Claim 21 includes the system of claim 20 further comprising a general purpose computing platform coupled to the first mixer, the second mixer, and the modulator, the general purpose computing platform decoding an incoming data signal from the in-phase incoming data signal and the quadrature phase incoming data signal, and generating the outgoing data signal (by way of example and not of limitation, see Fig. 7 and description at page 20, line 3 to page 21, line 4).

Claim 22 includes the system of claim 20 further comprising a telephone handset coupled to the first mixer, the second mixer, and the modulator, the telephone handset decoding an incoming data signal from the in-phase incoming data signal and the quadrature phase incoming

data signal, and generating the outgoing data signal (by way of example and not of limitation, see Fig. 7 and description at page 20, line 3 to page 21, line 4).

Claim 23 includes the system of claim 20 wherein an antenna is directly connected to the low noise amplifier, and the low noise amplifier is directly connected to the one or more subharmonic local oscillator mixers (by way of example and not of limitation, see Fig. 1 and description at page 7, line 8 to page 12, line 6).

VI GROUNDS OF REJECTION TO BE REVIEWED UPON APPEAL
(37 C.F.R. 41.37(c)(6))

1. Whether the Examiner has improperly rejected claims 1-4, 11-13, 19-20 and 23 under 35 U.S.C. § 102(e) over U.S. Patent No. 6,104,745 to Koh (hereinafter “Koh”) and U.S. Patent 6,397,044 to Nash. (hereinafter “Nash”).
2. Whether the Examiner has improperly construed claims 1-4, 11-13, 19-20 and 23 in rejecting them under 35 U.S.C. § 102(e) over U.S. Patent No. 6,104,745 to Koh (hereinafter “Koh”).
3. Whether the Examiner has improperly construed claims 5-8, 10, 14-15 and 21-22 in rejecting them under 35 U.S.C. § 103(a) over Koh in view of Nash.
4. Whether quadrature phase shift keying is frequency modulation.
5. Whether modulation with an oscillator operating at the carrier frequency is modulation with a subharmonic local oscillator signal.
6. Whether phase modulation is frequency modulation.
7. Whether the Examiner has provided a prima facie basis for the rejection of claims 9 and 16-18 in rejecting them under 35 U.S.C. § 103(a) over Koh in view of Nash in further view of U.S. Patent No. 5,152,005 to Bickley.

VII ARGUMENTS - (37 C.F.R. 41.37(c)(7))

1. **The Examiner has improperly rejected claims 1-4, 11-13, 19-20 and 23 under 35 U.S.C. § 102(e) over Koh and Nash.**

The Examiner has made a number of errors that obfuscate the rejection of claims 1-4, 11-13, 19-20 and 23. First, the Examiner states in the Office action mailed October 14, 2005 at paragraph 2 that those claims are rejected under 35 U.S.C. 102(e) as being anticipated by Koh et al. (U.S. Patent Number 6,397,044). Nevertheless, the correct patent number for Koh is 6,104,745, and it appears that the Examiner is primarily relying on that patent as the basis for the rejection of claim 1. Second, the refers to "figure 2, Rx VCO," which is an item on the drawings for U.S. Patent 6,397,044 to Nash. As such, the Examiner has cited to features in two different references as a basis for a rejection under 35 U.S.C. 102(e), which is improper. Accordingly, the rejection of claims 1-4, 11-13, 19-20 and 23 must be REVERSED.

2. **The Examiner has improperly construed claims 1-4, 11-13, 19-20 and 23 in rejecting them under 35 U.S.C. § 102(e) over Koh.**

The construction of claim 1 adopted by the Examiner is incorrect, and is used to improperly reject claim 1 over Koh. Claim construction is a question of law, and is reviewed *de novo*. *Markman v. Westview*, 52 F. 3d 967, 34 USPQ2d 1321 (Fed. Cir. 1995), *aff'd* 116 S.Ct. 1384 (1996).

Claim 1 includes a "a direct-conversion receiver receiving a signal modulated on a carrier frequency signal, the direct-conversion receiver further comprising one or more subharmonic local oscillator mixers; a local oscillator coupled to the direct conversion receiver, the local oscillator generating a signal having a frequency equal to a subharmonic of the carrier frequency signal; and a transmitter coupled to the local oscillator." In rejecting claim 1, the

Examiner states that Koh teaches "a direct conversion receiver 226 receiving a signal modulated on a carrier frequency signal," citing to col. 4, lines 32-41 of Koh. However, that section of Koh states that the "amplified signal is mixed by the first frequency mixer 226 with the oscillation frequency generated by the PLL 230." Thus, element 226 of Koh is not a direct conversion receiver but is instead a first frequency mixer, and the construction of first frequency mixer 226 as a direct conversion receiver is clearly incorrect and must be reversed.

The Examiner also states that Koh discloses that the direct conversion receiver further comprises "one or more sub harmonic local oscillator (230 + 232) mixers 228 (col 4 lines 58-67, col. 5 lines 1-3)." Nevertheless, element 230 is a phase locked loop, element 232 is a 90 degree phase shifter, and element 228 is a second frequency mixer. Thus, the Examiner has construed a single element, namely a sub-harmonic local oscillator mixer, to be three different elements - a phase locked loop, a 90 degree phase shifter, and a second frequency mixer. This construction is clearly incorrect. Even if the extraneous phase shifter limitation is excluded from the construction, the combination of a phase locked loop and a second frequency mixer would not be related to a sub-harmonic local oscillator mixer unless the phase locked loop was operating at a sub-harmonic frequency. Nothing in Koh suggests that phase locked loop 230 operates at a sub-harmonic frequency. In fact, the Examiner relies on two erroneous bases for asserting that phase locked loop 230 of Koh operates at a sub-harmonic frequency. The first of these is a reference to the sub-harmonic Rx VCO in figure 2 of Nash, which, as previously discussed, cannot provide any basis for the rejection under 35 U.S.C. 102(e) over Koh. The second is the assertion by the Examiner at page 2, paragraph 2 of the final office action that "phase shifter 232 creates sub harmonic." This assertion is clearly technically incorrect, as well as grammatically incorrect – the frequency of a signal is not changed merely by changing its phase, as discussed further below.

The Examiner's construction is all the more confusing in light of the admission by the Examiner

in the subsequent rejection of claims 5-6 under 35 U.S.C. 103(a) over Koh in view of Nash that "Koh fails to teaches a system further comprising a frequency multiplier coupled between the local oscillator and the transmitter." How can PLL 230 operate at a sub-harmonic of the carrier and then be used as a transmit oscillator? It can't, and as such, the construction of a "sub harmonic local oscillator mixer" adopted by the Examiner is incorrect and must be REVERSED.

Further evidence of the incorrect construction by the Examiner of "a local oscillator 230 coupled to the direct conversion receiver (see figure 2, RxVCO), the local oscillator 230 generating a signal having a frequency equal to a sub harmonic . . . of the carrier frequency signal" is given by the recognition by the Examiner that "PLL 230 is the transmitter." If PLL 230 is the transmitter, then it must operate at the carrier frequency in the full-duplex system of Koh, where the transmitted and received signals are at the same (*i.e.* carrier) frequency. As such, the construction of PLL 230 as "generating a signal having a frequency equal to a sub harmonic . . . of the carrier frequency signal" is incorrect and must be reversed.

The Examiner applies the same grounds of rejection for system claim 1 to method claim 11, and while the claims are drawn to different limitations, the reasons for error in claim construction that were discussed in regard to claim 1 also apply to claim 11. Claim 11 includes a "method for receiving and transmitting data comprising: receiving a carrier signal modulated with a data signal; mixing the carrier signal with a subharmonic local oscillator signal to extract a baseband signal; multiplying the subharmonic local oscillator signal; and modulating an outgoing data signal with the multiplied subharmonic local oscillator signal." As discussed, PLL 230 of Koh does not operate at a subharmonic of the carrier signal, but rather at the carrier signal. It is further noted that the Examiner has not even addressed the step of "multiplying the subharmonic local oscillator signal," and in light of the Examiner's

admission that Koh fails to disclose a multiplier, the construction of claim 11 as being anticipated by Koh is clearly improper and should be reversed.

Likewise, claim 20 includes different limitations from claim 1 or claim 11, but the reasons for error in claim construction that were discussed in regard to claims 1 and 11 also apply to claim 20. For example, the Examiner construes PLL 230 as "a local oscillator . . . generating a signal having a sub harmonic frequency of the carrier signal," but as previously discussed, Koh entirely fails to disclose any multiplier that would allow PLL 230 to be a local oscillator generating a signal having a subharmonic frequency of the carrier signal and to also satisfy the limitation of "a modulator 242 coupled to the . . . local oscillator . . . , the modulator receiving an outgoing data signal and modulating the outgoing data signal onto the . . . local oscillator signal . . . to generate an outgoing modulated carrier signal," such as where the modulator includes a multiplier. As such, the construction of claim 20 as being anticipated by Koh is clearly improper and must be REVERSED.

3. The Examiner has improperly construed claims 5-8, 10, 14-15 and 21-22 in rejecting them under 35 U.S.C. § 103(a) over Koh in view of Nash.

Claim 5 depends from claim 1, and includes the "system of claim 1 further comprising a frequency multiplier coupled between the local oscillator and the transmitter, wherein the frequency multiplier increases the frequency of the oscillator." As previously discussed, the Examiner admits in the discussion of the rejection of claims 5-6, 10, 14-15, and 21-22 under 35 U.S.C. 103(a) as being unpatentable over Koh in view of Nash that Koh "fails to teach a system further comprising a frequency multiplier coupled between the local oscillator and the transmitter, where the frequency multiplier increases the frequency of the oscillator," but then construes that multiplier to be phase locked loop 33 of Nash. However, this construction ignores

claim 1, which includes "a local oscillator coupled to the direct conversion receiver, the local oscillator generating a signal having a frequency equal to a subharmonic of the carrier frequency signal; and a transmitter coupled to the local oscillator." Furthermore, construction of phase locked loop 33 of Nash as being a frequency multiplier coupled between the local oscillator and the transmitter, wherein the frequency multiplier increases the frequency of the oscillator is contradicted by consideration of Nash as a whole, which discloses a transmit voltage controlled oscillator 31 that is directly connected to a power amplifier module without any multiplier. At col. 4, lines 41-46 of Nash, the function of the phase locked loop 33 is disclosed: "In more detail, the transmitter (30) comprises a phase locked loop (33), a reference frequency divider (34) and a power amplifier module (35). The phase locked loop up-converts the frequency of a baseband signal f_{bb} to a frequency for transmission, i.e. the PLL frequency modulates the carrier at a rate of f_{bb} ." It is clear from consideration of Nash that phase locked loop 33 is a component of the transmitter 30 that modulates the transmit oscillator, but it is not a frequency multiplier coupled between the local oscillator and the transmitter. This can be readily seen from Figure 1 of Nash.

Likewise, claim 6 includes the system of claim 5 wherein "the frequency multiplier increases the frequency of the oscillator up to the frequency of the carrier signal." The phase locked loop does not increase the frequency of the receive oscillator up to the frequency of the carrier signal, because there is a separate transmit oscillator that operates at the frequency of the carrier signal, all of which are components of the transmitter 30 of Nash. Thus, the construction adopted by the Examiner is fundamentally flawed, and must be REVERSED.

4. Quadrature Phase Shift Keying is Not Phase Modulation.

In regards to claims 7 and 8, the Examiner errs in construing quadrature phase shift keyed modulation to be phase modulation. While Nash does disclose in-phase and quadrature phase signals, that alone is not enough to establish quadrature phase shift keying. In fact, just past the section of Nash cited by the Examiner as support for the rejection of claim 7 is a statement that makes it clear that Nash only discloses phase modulation, and not quadrature phase shift keying: "The VCO outputs a signal f_{tx} having a peak frequency shift Δf_{tx} proportional to the amplitude of the applied modulating signal, leading to a peak frequency deviation of $f_{tx} \pm \Delta f_{tx}$." Nash, col. 5, lines 52-55. As such, it is clear that the frequency modulation is proportional to the amplitude variations and is not related to quadrature phase shift keying. The term "quadrature" is not even used in Nash, which discusses GSM and thus implicates Gaussian Minimum Shift Keying at best (which is also not disclosed). The construction of claims 7 and 8 by the Examiner is fundamentally flawed, and must be REVERSED.

5. Modulation with an Oscillator Operating at the Carrier Frequency is not Modulation with a Subharmonic Local Oscillator Signal.

The Applicants note that in the final rejection, the Examiner states that claim 19 is rejected under 35 U.S.C. 102, but then discusses the rejection of claim 19 under 35 U.S.C. 103. Thus, it is clear that the Examiner rejects that claim under 35 U.S.C. 103, and the Board of Patent Appeals and Interferences does not need to return this action to the Examiner for clarification. It is further noted that the Examiner's construction of claim 19 is incorrect, as claim 19 states "modulating the outgoing data signal with the subharmonic local oscillator signal comprises: modulating an outgoing in-phase data signal and an outgoing quadrature phase data signal with the subharmonic local oscillator signal at a subharmonic modulation index to generate a modulated outgoing data signal," which the Examiner construes as modulation with

subharmonic local oscillator 22 signal of Nash. However, the section of Nash cited in support of this construction discusses modulation with the transmitter Voltage Controlled Oscillator 37, see col. 4, lines 54-65. The transmitter VCO 37 of Nash operates at the carrier frequency, **not** at a subharmonic frequency. Thus, the construction of claim 19 is fundamentally flawed, and must be REVERSED.

6. Phase Modulation is not Frequency Modulation.

In regards to claims 10 and 14-15, the Examiner admits that Koh modified by Nash does not disclose a frequency modulator, but then construes phase modulation to be frequency modulation ("However Koh system does modulates frequency, which is vary at the rate of the modulating wave from amplitude, which is call phase modulation.") Phase modulation is simply not frequency modulation. In phase modulation, the frequency of the carrier signal remains the same but the phase is varied to encode amplitude variation, whereas in frequency modulation, the frequency of the carrier signal varies within a band around the central carrier frequency. Although the Examiner also appears to reject claims 10 and 14-15 based on official notice that "[f]requency Modulation is a common way of modulating frequencies and is well known in the art," no attempt is made by the Examiner to explain how the system of Koh as modified by Nash would need to be modified to allow the phase modulated signal to be frequency modulated. At a minimum, Koh as modified by Nash fails to disclose each element of the invention of claims 10 and 14-15, and therefore fails to provide a prima facie basis for the rejection of those claims. The rejection of claims 5-6, 10, 14-15, and 21-22 must therefore be REVERSED.

7. The Examiner has failed to provide a prima facie basis for the rejection of claims 9 and 16-18.

In regards to the rejection of claims 9 and 16-18 over Koh in view of Nash and further in view of Bickley, the Applicants note that neither Koh, Nash nor Bickley disclose a subharmonic local oscillator that is used as the transmit and receive local oscillator. Furthermore, Bickley fails to disclose "a switch coupled between the local oscillator and the phase locked loop, wherein the switch can couple the phase locked loop to the local oscillator during a transmit cycle and can decouple the phase locked loop from the local oscillator during a receive cycle." While Bickley discloses a switch coupled to an oscillator, it is not a local oscillator that is used for transmitting and receiving. Thus, the Examiner has failed to provide a prima facie basis for the rejection of claims 9 and 16-18, and must be REVERSED.

All other claims that were not specifically addressed are dependent and are allowable at least for the reasons that they depend from allowable base claims and add limitations not found in the prior art. Although they are not specifically traversed herein, the Applicants reserve the right to specifically traverse such dependent claims in response to the Examiner's Answer, if the Examiner's Answer raises issues in which such claims become relevant to this appeal.

VIII APPENDIX OF CLAIMS (37 C.F.R. 41.37(c)(8))

The text of the claims involved in the appeal are:

1. A system for transmitting and receiving data comprising:
a direct-conversion receiver receiving a signal modulated on a carrier frequency signal, the direct-conversion receiver further comprising one or more subharmonic local oscillator mixers;
a local oscillator coupled to the direct conversion receiver, the local oscillator generating a signal having a frequency equal to a subharmonic of the carrier frequency signal; and
a transmitter coupled to the local oscillator.
2. The system of claim 1 wherein the direct conversion receiver further comprises:
a phase shifter coupled to a first subharmonic local oscillator mixer, where the output of the first subharmonic local oscillator mixer is used to generate a quadrature signal of a phase shift keyed signal; and
a second subharmonic local oscillator mixer, where the output of the second subharmonic local oscillator mixer is used to generate an in-phase signal of a phase shift keyed signal.
3. The system of claim 2 wherein the phase shifter is further coupled to the local oscillator.
4. The system of claim 2 further comprising a low-noise amplifier coupled to the phase shifter, wherein the signal modulated on the carrier frequency signal is received by the low-noise amplifier and is transmitted to the phase shifter after being amplified.
5. The system of claim 1 further comprising a frequency multiplier coupled between the local oscillator and the transmitter, wherein the frequency multiplier increases the frequency of the oscillator.

6. The system of claim 5 wherein the frequency multiplier increases the frequency of the oscillator up to the frequency of the carrier signal.

7. The system of claim 1 wherein the transmitter comprises:
a frequency multiplier coupled to the local oscillator; and
an in-phase/quadrature modulator coupled to the frequency multiplier, receiving an in-phase modulation input signal and a quadrature modulation input signal, and outputting a quadrature phase shift keyed signal modulated at the multiplied local oscillator frequency.

8. The system of claim 1 wherein the transmitter comprises:
an in-phase/ quadrature modulator coupled to the local oscillator, receiving an in-phase modulation input signal and a quadrature phase shift keyed signal modulated at the local oscillator frequency; and
a frequency multiplier coupled phase/quadrature modulator and multiplying the quadrature phase shift keyed signal.

9. The system of claim 1 wherein the transmitter comprises:
a frequency modulator coupled to the local oscillator, wherein the local oscillator is modulated by the frequency modulator;
a phase locked loop coupled to the frequency modulator and the local oscillator; and
a switch coupled between the local oscillator and the phase locked loop, wherein the switch can couple the phase locked loop to the local oscillator during a transmit cycle and can decouple the phase locked loop from the local oscillator during a receive cycle.

10. The system of claim 1 wherein the transmitter comprises:
a frequency modulator coupled to the local oscillator, where the local oscillator is modulated by the frequency modulator;
a voltage-controlled reference oscillator coupled to the frequency modulator, where the voltage-controlled reference oscillator is modulated by the frequency modulator; and
a phase locked loop coupled to the local oscillator in a feedback loop, the phase locked loop further coupled to the voltage controlled oscillator.

11. A method for receiving and transmitting data comprising:
receiving a carrier signal modulated with a data signal;
mixing the carrier signal with a subharmonic local oscillator signal to extract a baseband signal;
multiplying the subharmonic local oscillator signal; and
modulating an outgoing data signal with the multiplied subharmonic local oscillator signal.

12. The method of claim 11 wherein mixing the carrier signal with the subharmonic local oscillator signal to extract the baseband signal further comprises:
mixing the carrier signal with the subharmonic local oscillator signal to extract an in-phase signal;
phase-shifting the subharmonic local oscillator signal; and
mixing the carrier signal with the phase-shifted subharmonic local oscillator signal to extract a quadrature phase signal.

13. The method of claim 11 wherein mixing the carrier signal with the subharmonic local oscillator signal to extract the baseband signal further comprises:
mixing the carrier signal with the subharmonic local oscillator signal to extract an in-phase signal; phase-shifting the carrier signal; and
mixing the phase-shifted carrier signal with the subharmonic local oscillator signal to extract a quadrature phase signal.

14. The method of claim 11 wherein modulating the outgoing data signal with the subharmonic local oscillator signal comprises:
multiplying the subharmonic local oscillator signal; and
modulating an outgoing in-phase data signal and an outgoing quadrature phase data signal with the multiplied subharmonic local oscillator signal.

15. The method of claim 11 wherein modulating the outgoing data signal with the subharmonic local oscillator signal comprises:

modulating an outgoing in-phase data signal and an outgoing quadrature phase data signal with the subharmonic local oscillator signal to generate a modulated outgoing data signal; and

multiplying the modulated outgoing data signal to generate the outgoing data signal.

16. The method of claim 11 wherein modulating the outgoing data signal with the subharmonic local oscillator signal comprises:

frequency modulating the subharmonic local oscillator signal during a transmit cycle; and

interrupting frequency modulation of the subharmonic local oscillator signal during a receive cycle.

17. The method of claim 16 further comprising opening a phase locked loop during the transmit cycle to lock the subharmonic local oscillator signal.

18. The method of claim 16 further comprising frequency modulating a reference oscillator signal of a phase locked loop that locks the subharmonic local oscillator signal.

19. The method of claim 11 wherein modulating the outgoing data signal with the subharmonic local oscillator signal comprises:

modulating an outgoing in-phase data signal and an outgoing quadrature phase data signal with the subharmonic local oscillator signal at a subharmonic modulation index to generate a modulated outgoing data signal; and

multiplying the modulated outgoing data signal by an inverse subharmonic to generate the outgoing data signal.

20. A system for transmitting and receiving data comprising:

a low noise amplifier receiving a modulated incoming carrier signal having a carrier signal frequency;

a local oscillator generating a signal having a subharmonic frequency of the carrier signal;

a first mixer coupled to the low noise amplifier and the local oscillator, the first mixer receiving the modulated incoming carrier signal and generating an in-phase incoming data signal;

a second mixer coupled to the low noise amplifier and the local oscillator, the second mixer receiving the modulated incoming carrier signal and generating a quadrature phase incoming data signal;

a modulator coupled to the local oscillator, the modulator receiving an outgoing data signal and modulating the outgoing data signal onto the local oscillator signal to generate an outgoing modulated carrier signal; and

a transmit amplifier coupled to the modulator, the transmit amplifier amplifying the outgoing modulated carrier signal to a transmission power level.

21. The system of claim 20 further comprising a general purpose computing platform coupled to the first mixer, the second mixer, and the modulator, the general purpose computing platform decoding an incoming data signal from the in-phase incoming data signal and the quadrature phase incoming data signal, and generating the outgoing data signal.

22. The system of claim 20 further comprising a telephone handset coupled to the first mixer, the second mixer, and the modulator, the telephone handset decoding an incoming data signal from the in-phase incoming data signal and the quadrature phase incoming data signal, and generating the outgoing data signal.

23. The system of claim 20 wherein an antenna is directly connected to the low noise amplifier, and the low noise amplifier is directly connected to the one or more subharmonic local oscillator mixers.

IX. EVIDENCE APPENDIX (37 C.F.R. 41.37(c)(9))

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X. RELATED PROCEEDINGS APPENDIX (37 C.F.R. 41.37(c)(10))

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Respectfully submitted,

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